

Course Outline

Lecture 1

Learning Objectives

- ☐ To use set notations
- ☐ To apply operations (union, intersection) on sets
 - ☐ To define de Morgan's Laws for sets
 - ☐ To define relations on sets
 - ☐ To define set partitions

Lecture 2

Learning Objectives:

- ☐ To describe functions
- ☐ To define a “one-to-one” and “onto” function
- ☐ To apply and distinguish special kinds of functions (i.e. absolute value, floor and ceiling, logarithmic, exponential and polynomial)

Lecture 3

Learning Objectives

- To apply the summation and product notation
 - To define a matrix
- To solve problems on matrix summation, subtraction and multiplication
 - To find the transpose of a matrix
 - To calculate the inverse of a matrix

Lecture 4

Learning Objectives

- ☐ To define a proposition
- ☐ To form a compound proposition using connectives
- ☐ To determine the truth values of compound propositions based on the truth values of their constituent propositions
- ☐ To use the different ways of expressing implication
- ☐ To determine the equivalence of two propositions

Lecture 5

Learning Objectives

- To apply the division algorithm
- To apply the Euclidean algorithm

Lecture 6

- To apply the Principle of Mathematical Induction
- To solve the Towers of Hanoi puzzle
- To define a recurrence relation

Lecture 7

- To combine propositions using connectives
- To construct the truth table of a given compound proposition
 - To define de Morgan Law for logic
- To define the difference between a predicate and a proposition
 - To use a quantifier in a predicate



Lecture 8

- To apply quantifiers on predicates
- To apply the de Generalized de Morgan's Laws
- To determine the truth value of predicates involving combination of two quantifiers

Lecture 9

- To apply the sum rule and product rule in solving problems
- To apply the principles of counting (i.e. combination, permutation) in solving problems

Lecture 10

- To define the Binomial Theorem
- To understand the relationship between Pascal's Triangle and the Binomial Theorem
- To apply the Pigeonhole Principle in counting

Lecture 11

- To define probabilities
- To calculate probabilities of events
- To calculate conditional probabilities
- To apply Bayes' Theorem in calculating probabilities

Lecture 12

- To define a random variable
- To construct probability distribution function and cumulative probability distribution function
- To apply some special kinds of probability distributions, i.e. finite uniform distribution and binomial distribution

Lecture 13

- To calculate the mean, median and mode
- To calculate and interpret the measure of spread
- To distinguish between population parameter and sample statistic